FPM 76

Report No. 75-1-12

March 1975
5230

EVALUATION OF SOUTHERN PINE BEETLE INFESTATION ON EGLIN AIR FORCE BASE, FLORIDA

By

J. D. Ward and P. J. Barry

INTRODUCTION

An evaluation of southern pine beetle, *Dendroctonus frontalis* Zimm., infestations was conducted on Eglin Air Force Base by the U. S. Forest Service, Forest Pest Management, during February 1975. This beetle is the most destructive insect enemy of southern pines and has the potential to cause severe tree mortality. Although no previous outbreaks have been recorded on the Base, it is a native pest and is currently in outbreak status on approximately 50 million acres in 10 southern states. The nearest known infestations are located about 75 miles north in the State of Alabama.

We appreciate the assistance of Eglin Air Force Base personnel and the Florida Division of Forestry in making this evaluation.

TECHNICAL INFORMATION

Insect - Southern pine beetle, *Dendroctonus frontalis* Zimm.

Importance - This beetle is considered the most destructive insect enemy of pines in the southern United States and Mexico. Outbreaks may occur at irregular intervals every 10 to 20 years and generally last from 2 to 5 years.

Hosts - All species of southern yellow pines are attacked. However, loblolly, *Pinus taeda* L., and shortleaf pine, *P. echinata*, are the preferred hosts. On Eglin Air Force Base the beetle is attacking loblolly pine, slash pine, *P. elliottii*, spruce pine, *P. glabra*, sand pine, *P. clausa*, and longleaf pine, *P. palustris*

Type of Damage - Attacks almost always result in the death of the host trees. The adult beetles girdle the host by mining in the cambium layer while constructing egg galleries. Also, the adult beetles introduce blue staining fungi, *Ceratocystis* spp., which block water conduction in the stem. Spot infestations may range in size from one tree to several thousand trees.

Life Cycle - The adult southern pine beetle is a dark reddish brown beetle about 1/8-inch long. The beetles attack trees in masses and construct winding S-shaped egg galleries in the cambium. Eggs deposited along the galleries hatch into whitish, legless grubs (larval stage) that feed in the cambium. When fully developed, the larvae mine to the outer bark where they pupate and transform to adults. New adults chew their way to the outside and fly to green trees in the area.

The complete life cycle takes about a month during the summer and as many as seven generations may be produced annually in this area.

Description of Timber Resource on Eglin Air Force Base - Eglin Air Force Base was formerly known as the Choctawhatchee National Forest. Of Eglin's total land area (464,800 acres) about 406,000 acres are classified as commercial forest land. Approximately 186,000 acres of this land are available for forestry operations and 220,000 acres of the commercial forest land are utilized solely for military testing purposes.

The volume of timber on the Base is estimated at 594 million board feet of pine sawtimber and 839 thousand cords of pulpwood with an additional 43 million board feet of hardwood sawtimber and 211 thousand cords of pulpwood. Longleaf, slash, and sand pines are the most important commercial species. More than half of the standing timber is overmature. The average 50-year site index for slash pine is between 60 and 70 feet.

METHODS

On February 21, 1975, an aerial sketchmap survey was conducted on 250,000 acres of the Eglin Air Force Base by the Asheville Office of Forest Pest Management. East-West flight lines established at 1-mile intervals provided 100 percent coverage of survey area (Figure 1). Observers plotted all red-topped and fading pines within a 1/2-mile strip on either side of the flight lines on a 1:62,500-scale aerial photo mosaic.

A total of seven spots were ground checked on February 5 to determine the cause of mortality and, if caused by southern pine beetle, to determine the number of infested trees and the condition of the brood.

RESULTS AND DISCUSSION

The aerial survey showed infestations localized in a 20,000-acre area on the eastern section of Eglin Air Force Base (Figure 1). Aerial observers found a total of 12 spots of dying pines with an estimated 6,736 red and fading trees in the survey area. One spot was detected on private land about a mile southwest of DeFuniak Springs.

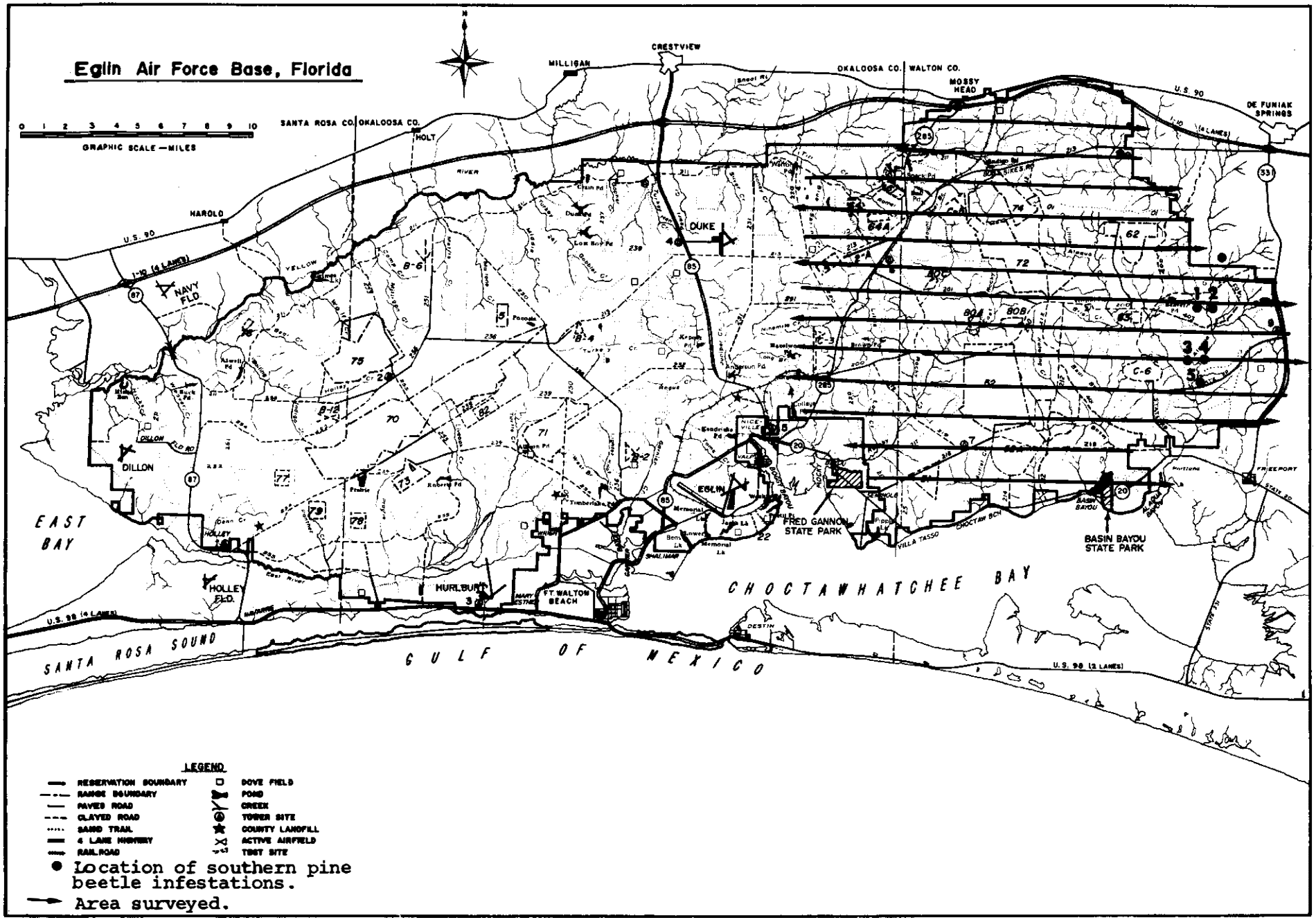

Figure 1. Location of southern pine beetle infestations on Eglin Air Force Base, Florida, February 1975.

Ground checking revealed that all spots observed on the Base were caused by southern pine beetle. Some of the 11 spots detected from the air were linked together by green infested trees so actually there were five large infestations which contained a total of approximately 30,000 infested trees (Table 1). Two additional small infestations containing only green infested trees were detected near the larger infestations.

Table 1. Summary of ground data taken during evaluation of southern pine beetle infestations on Eglin Air Force Base, Fla., February 1975.

Spot No.	No. of red and fading trees	No. of black-topped trees	No. of green infested trees	Total No. of infested trees	Total No. of attacked trees
1	2,392	2,409	599	2,484	5,400
2	1,860	1,874	466	1,932	4,200
3	8,472	8,531	2,122	8,797	19,125
4	15,150	15,254	3,796	15,732	34,200
5	1,595	1,605	400	1,635	3,600
Total	29,469	29,673	7,383	30,601	66,525

Bark samples from four of the five pine species in the area revealed the following:

Species	Brood density per sq. ft. of bark surface	Ratio of Increase attacks/brood
Sand pine	193	1:14
Slash pine	561	1:37
Longleaf pine	411	1:29
Spruce pine	251	1:31

The brood density and ratio of increase indicate a high potential for increasing population. For every attack on the trees from 14 to 37 brood are produced. Emerging beetles have been attacking green trees throughout the winter which has resulted in a rapid expansion of the infestations. The infestations have had to be re-marked for salvage several times due to the spread of the beetles.

Southern pine beetle brood appeared healthy. There was little mortality caused by disease. Predators, parasites, and insects usually associated with southern pine beetle infestations were present but did not appear to be significantly reducing the southern pine beetle population. The clerid beetle, *Thanasimus dubius*, and several species of woodpeckers were the most numerous predators. Many of the earlier attacked trees

had been attacked by wood borers such as the ambrosia beetle, *Platypus flavicornis* F., and the southern pine sawyer, *Monochamus titillator* (F.).

Factors contributing to the rapid expansion of the beetle population in this area have been an abundance of densely stocked overmature timber stands, a very mild winter, and a deficit in precipitation during 1974 (Figure 2).

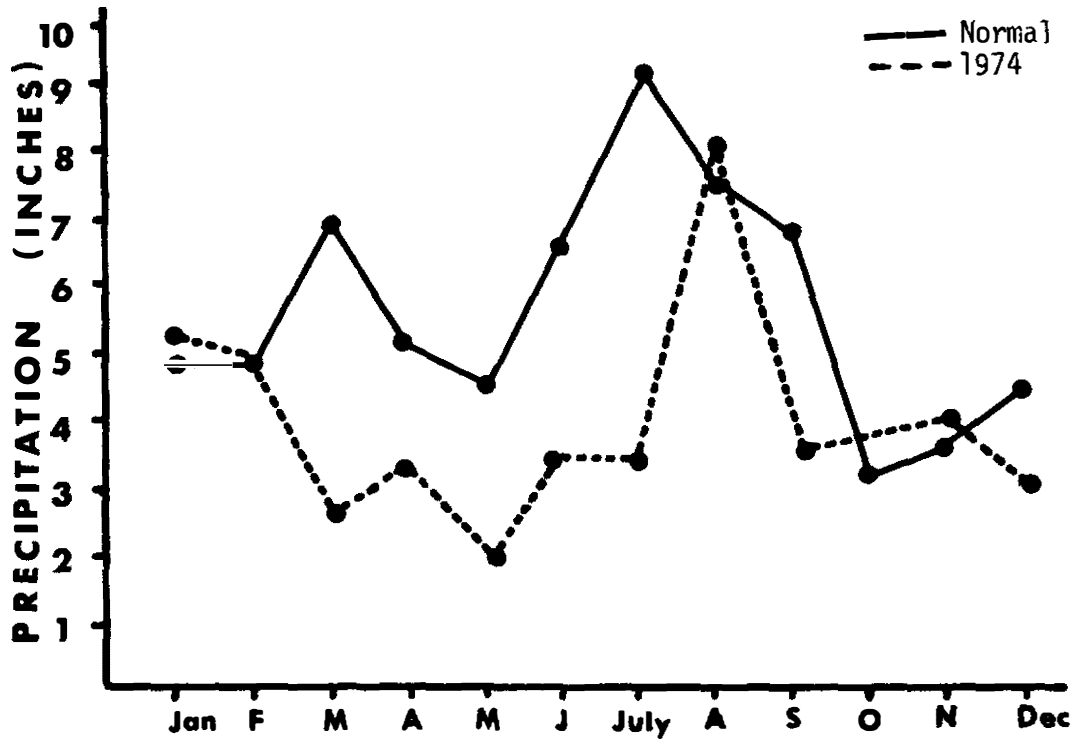

Figure 2. Average monthly precipitation in outbreak area for 1974.

In conclusion, this evaluation has shown a severe outbreak of southern pine beetle on Eglin Air Force Base. Although the outbreak is localized at this time, there is a high potential for the outbreak to expand in area and intensity. Unless natural factors intervene, the outbreak is expected to increase in 1975.

RECOMMENDATIONS

The three methods for suppressing southern pine beetle infestations recommended by the U. S. Forest Service are as follows:

1. Removal of Infested Trees by Commercial Sale or Administrative Use. When infested trees of merchantable size are accessible, they should be removed by commercial sale or administrative use procedures. Logging of the infested material should begin immediately. Contract time limits should insure rapid removal.

   Where practical, and if host type is present, a 40- to 70-foot buffer strip should be marked and cut adjacent to and ahead of the most recently infested trees. This practice is effective in reducing the possibility of "breakouts." When only a small volume of infested merchantable material occurs in a spot, non-infested trees surrounding the spot may be marked to provide an operable cut.

   The order of priority for removing beetle infested timber from a spot should be as follows:

   Trees having nearly developed broods (usually the red and fading trees).

   Trees having young broods (usually the green, recently infested trees).

   Trees in the buffer zone.

2. Piling and Burning. Unmerchantable or inaccessible southern pine beetle infestations can be suppressed by cutting, piling and ~~thoroughly burning~~ the bark of infested trees. The entire bark surface must be thoroughly burned to insure effective control. The order of priority for cutting, piling and burning infested trees, particularly the large spots, is the same as paragraph (1) under removal of infested trees by commercial sale or administrative use. Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts" every effort should be made to locate and treat all green infested trees during the piling and burning operation.

3. Chemical Control. Chemical formulation recommended for southern pine beetle control is a 1/2-percent Lindane spray with No. 2 fuel oil as the carrier. This may be formulated from a 20-percent Lindane emulsifiable concentrate or oil concentrate at the rate of 11 pints of concentrate in enough fuel oil to make 55 gallons of spray. (Ratio of one part 20-percent Lindane EC to 39 parts No. 2 diesel fuel.)

   Cut, limb, and buck all infested trees into workable lengths. Spray the infested bark surface to the point of run-off. A compressed air sprayer (3-gallon capacity or equivalent) is an ideal applicator. Infested logs must be turned two or three times to insure complete treatment of the infested bark. Spray stumps and bark removed by woodpeckers. Low pressure sprayers may be used to treat large, accessible infestations.

The order of priority for cutting and spraying infested trees in large spots is the same as paragraph (1) under removal of infested trees by commercial sale or administrative use. Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts" every effort should be made to locate and treat all green infested trees during the chemical control operation.

Never spray trees from which southern pine beetle brood has emerged. Natural enemies of the southern pine beetle in these trees can then complete their development. To prevent aerial spotters from mapping treated spots, cut trees with red needles from which beetles have emerged.

Instructions for minimizing the adverse effects of mixing, transporting and storing pesticides, applying pesticides and disposing of pesticide containers and excess chemicals are outlined in Sec. 8.3 of the Forest Service Health and Safety Code and FSM 5242.21. Detailed safety procedures should be outlined in the project suppression plan.

4. Reexamination of Treated Areas. Reexamine areas where infested trees were removed by commercial sales, piled and burned, or chemically treated within two or three weeks after treatment to check for additional infested trees. If additional trees are found, treat them.

PRECAUTIONARY PESTICIDE USE STATEMENT

Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers under lock and key—out of the reach of children and animals—away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Do not apply pesticides when there is danger of drift, when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays of dusts; wear protective clothing and equipment if specified on the container.

If your hands become contaminated with a pesticide, do not eat or drink until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Do not clean spray equipment or dump excess spray material near ponds, streams, or wells. Because it is difficult to remove all traces of herbicides from equipment, do not use the same equipment for insecticides or fungicides that you use for herbicides.

Dispose of empty pesticide containers promptly. Have them buried at a sanitary land-fill dump, or crush and bury them in a level, isolated place.